CIRRO-CUMULI AND THUNDERSTORMS

By R. M. DOLE

[Weather Bureau, East Lansing, Mich.]

It has been observed repeatedly by the writer that the appearance of a certain type of Alto-Cumuli and Cirro-Cumuli (in the form of small balls) during the summer months is almost a sure sign of thunderstorms, and that clouds of this character often preceded the disturbances by a number of hours; also, the more vigorous and pronounced the type of cloud, the more violent the storms that follow. During 1924, between May and the middle of August, the sky was systematically watched and the types of clouds and the times of their appearance were carefully noted. The table below gives the results.

Month	Number of thunderstorms	A.-Cu. or Ci.-Cu. observed	Sky obscured or no Ci.-Cu. seen	Ci.-Cu. seen but no thunderstorm
May	5	4	1	0
June	12	10	2	1
July	13	9	4	3
August	4	3	1	1
Total	34	26	8	5

Thundershowers without the warning Ci.-Cu. being observed occurred on eight days, but were of a local nature, mild and merely overgrown Cumulus. In three of the eight cases overcast skies precluded any observations of the upper clouds. In two instances another kind of Cirro-Cumuli was observed. These were the flat form, very nearly covering the sky and were passing when high pressure areas of decided strength were dominating the weather. This flat type seems to denote stable conditions; the ball type unstable.

Actually 26 thunderstorms out of 34 were preceded by these clouds, or 76 per cent. The more violent thunderstorms with squalls and hail of a destructive nature were all preceded by small, detached patches of Cirro-Cumuli, the time of their appearance in advance of first thunder varying from one to twelve hours. It was also noted that Cirro-Cumuli in the morning were followed by afternoon thunderstorms, while the appearance of these clouds in the late afternoon or evening was followed by thunderstorms occurring after midnight or the next morning.

Observations of A.-Cu., Ci.-Cu. and Thunderstorms

Date	Time, speed, and direction of clouds	Time of thunderstorm and intensity
May		
3	At intervals on the 2d, rapid, from west	10:09 a. m.-12:45 p. m.
6	7 p. m. of the 5th, moderate, from west	5:25 p. m.
7	Noon of the 7th, moderate, from southwest	5:50 p. m.
13	7 p. m. of the 12th, slow, from north	10:55 a. m.-2:49 p. m.
15	Sunset, moderate, from the north; no thunderstorm	
17	Cloudy, upper clouds shut out	3:53 p. m.
June		
8	Cloudy, upper clouds not visible, during day (7th)	3:00 a. m.
9	6:45 p. m. of the 8th, rapidly, from southwest	6:35 a. m.
11	A. m. of the 11th, moderate, from northwest	4:41 p. m.
12	P. m. 11th, moderate, from northwest	7:50 p. m.
17	P. m. 16th, also afternoon 17th, slow, from the west	6:33 p. m.
19	A. m. of the 19th, moderate, from northwest	D. N. a. m.
20	7 a. m., moderate, from west; 2:30 p. m. vigorous patch, moderate, from southwest.	3:10 p. m. Severe.
21	7 p. m. 20th, vigorous form, rapidly, from northwest	D. N. a. m.
22	A. m. 22d. rapidly, from the northwest	4:55 a. m. Moderate
24	P. m. 23d, moderate, from the west	4:55 a. m.
28	27th, at sunset, vigorous type, moderate, from northwest.	7:38 a. m. Severe.
30	P. m. of the 29th, moderate, from the north	1:00 p. m.
July		
1	None observed	4:15 p. m.
2	None observed; Cu. grew to Cu.-Nb	4:08 p. m.
7	Overcast to preclude view of upper clouds	6:11 a. m.
8	A. m. of the 8th, moderate, from the west	2:40 p. m.
9	Noon of the 9th, moderate, from the west	7:10 p. m.
12	None observed	11:35 a. m.
13	Like beach sand with A.-Cu	No thunderstorm.
16	Evening of the 15th, moderate, from the northwest	7:12 p. m. Vigorous.
18	Like beach sand, very rapid from northwest, with A.-Cu.	No thunderstorm.
19	In army formation with sheets of A.-Cu., moderate, from northwest.	Do.
21	9 a. m., also evening, moderate, from southwest	12:48 p. m. Severe. 11:15 p. m. Severe.
27	Sunset 26th, rapidly, from northwest; 2 p. m., rapidly, from west. (Vigorous patches in both cases.)	3:35 p. m. Severe. 8:15 p. m. Severe.
28	7:15 p. m. of the 27th, moderate, from the west	D. N. a. m.-1:00 a. m.
29	Evening of the 28th, moderate, from west; vigorous patch.	3:12 a. m. Vigorous. 4:54 p. m. Vigorous.
30	9 a. m. and 4 p. m., moderate, from the west	10:55 p. m. Vigorous.
31	3 p. m. 30th, moderate, from west	D. N. a. m. Vigorous
August		
2	A.-Cu. and Ci.-Cu. like beach sand passing rapidly all day from northwest.	No thunderstorm.
4	5 p. m. of the 3d, moderate, from the west	5:14 a. m. Moderate. 6:14 a. m.-8:58 a. m.
5	P. m. 4th, rapidly from the west	5:00 p. m. Severe.
6	Noon of the 6th, rapidly from the west	D.N. a. m. Moderate. 3:28 p. m.
8	None observed	12:24 p. m.

ARE PRESENT METHODS OF RAINFALL INSURANCE SOUND?

By CYRUS H. ESHLEMAN

[Weather Bureau Office, Ludington, Mich.]

Whether under the prevailing methods of rainfall insurance the assured are receiving as much protection as they think they are receiving and as much as the companies think they are furnishing, may be seriously questioned.

Insurance is written only against rainfall amounting to 0.10 inch or over. Even 0.01 inch is often sufficient to interfere with a program and keep crowds at home, and there are many unfavorable days when the total within a few specified hours does not reach 0.10.

About a year ago a home-coming celebration was held at Ludington, and the committee in charge took out insurance. The writer was asked to note carefully the time and amount of any rain that might occur. The committee was told that while they were being given some degree of protection, there was considerable possibility of dissatisfaction, for the reason already stated. An examination of rainfall records for the preceding season showed that in at least two-thirds of the unfavorable cases no insurance would have been received. No effort was made to dissuade the parties from taking out insurance but they were told of the exact working of the specifications.

It happened that no rain fell that week, so the insured were perfectly satisfied.

This summer, a few weeks ago, an out-of-doors carnival was held, and the managers took out insurance. Again the writer was asked to observe the rainfall and the parties were informed as to how the insurance might work out, though they were told the insurance was highly advisable as it would afford a considerable degree of protection. In this case also absolutely no rain fell during the week.

But the carnival committee had said that loss for a similar carnival several years ago was suffered owing to unfavorable weather. So the records were examined for

that period in order to learn whether any insurance would have been received had a policy been secured. It was found that very little rain fell. There was rain on two afternoons, but scarcely any at night during the carnival hours for which insurance would have been written. However, the grounds were wet and the sky overcast, and these conditions kept away large numbers of people.

In order to learn the averages through a period of years the rainfall records at Ludington from May 1 to September 30, in the 10 years from 1915 to 1924, inclusive, have been examined. The results are given in Table 1. All cases are counted, both afternoon and night, when during the hours from 2 to 5 p. m. or 6 to 9 p. m., a total of 0.01 or more fell and would apparently have seriously affected the program or attendance. The first column gives the number of times in each year insurance would have been received, the second column the number of times none would have been received, since the rainfall was less than 0.10 and not less than 0.01.

TABLE 1.—*Number of times at Ludington, Mich., from May 1 to September 30, in the years 1915 to 1924, inclusive, when 0.10 or more of rain fell between 2 p. m. and 5 p. m., and number when 0.01 to 0.09, inclusive, fell*

Year	0.10 or more	0.01 to 0.09, inclusive.
1915	9	21
1916	14	19
1917	9	20
1918	5	19
1919	7	19
1920	9	8
1921	4	10
1922	10	8
1923	6	8
1924	7	20
Total	80	152

It is seen that the latter outnumber the former almost two to one. But the facts are even worse than the table indicates. There are times when light rain amounts to only a trace, or when thunderstorms threaten but do not actually strike the station; on such occasions the attendance may be badly affected. The number of such times averages about four per year, which added to the total makes the nonbenefiting instances decidedly more than double the benefiting.

The results would be somewhat more favorable were the policies to cover more than three hours. The fact that the period is made short to keep down the cost, without the probabilities being considered that the specified total of rain may not be reached, indicates misunderstanding on the part of many. A four-hour period would be preferable though costing considerably more. The whole day might be still better.

There is no doubt a rainfall of over 0.10 may be more damaging than a lighter one, and probably should have heavier insurance. But there should be some protection against the numerous lighter rains when events would also be interfered with. Probably about half as much for the lighter rains would be a fair amount.[1]

[1] Doubtless the question of the greater frequency of light rains would enter into the rate problem. As the writer points out, the lighter rains are about twice as frequent as those over 0.10 inch.—*B. M. V.*

NOTES, ABSTRACTS, AND REVIEWS

PROF. H. H. HILDEBRANDSSON, 1838–1925

Prof. Hugo Hildebrandsson, the distinguished Swedish meteorologist, died at Upsala, July 29, 1925. On August 19 he would have completed his eighty-seventh year. His death means something more than the passing of one who was active in contributions to meteorology throughout a long life. Prof. Hildebrandsson was the last survivor of the group of men who assembled at Leipzig in 1869 and founded the International Meteorological Organization. He was a contemporary and associate of such famous pioneers as Buchan, Buys Ballot, Hann, Jelinek, Neumayer, Scott, and Wild. With him, therefore, a great generation of meteorologists passes into history.

Hildebrandsson was born at Stockholm in 1838, and took his degree as doctor of philosophy at the University of Upsala in 1866. In 1878 he was appointed professor of meteorology at the same university and director of its meteorological observatory, a position which he held until his retirement in 1906. He was a member of the International Meteorological Committee for many years and served as its secretary from 1903 to 1906. He received the Symons medal of the Royal Meteorological Society in 1920.

While his scientific work in meteorology covered a wide range, he was particularly identified with the study of clouds and of atmospheric circulation. In these studies he was intimately associated with Teisserenc de Bort. He was instrumental in preparing the International Cloud Atlas, in organizing the international cloud observations in 1896–97, and in presenting the results of these epoch-making observations. He published jointly with Teisserenc de Bort a monumental history and digest of studies in dynamic meteorology, "Les Bases de la Météorologie Dynamique," one of the most striking features of which is its facsimile reproductions of early meteorological documents. The subject that interested him above all others was the general circulation of the atmosphere. Probably no other meteorologist has devoted so much industry to collecting and sifting the data bearing upon this subject, and few have done so much to elucidate it.—*C. F. T.*